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Fresh Market Tomato Pruning Trial for Northern Indiana, 2001

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Fresh market tomatoes are sometimes pruned to remove some or all of the branches below the first mainstem flower cluster. Pruning is known to increase average fruit size and decrease total yield. Effects on marketable yield and early yield vary among cultivars and with the degree of pruning. This trial was conducted to evaluate a range of pruning treatments on two cultivars grown in the Midwest: Mountain Spring and Florida 91. Florida 91 has a larger vine and is later-maturing than Mountain Spring. The trial was conducted at the Pinney-Purdue Agricultural Center in Wanatah, Indiana.

Materials and Methods

Experimental design:	Randomized complete block design with four replications.
Treatments:	2 X 6 factorial: 2 cultivars (Florida 91 and Mountain Spring) and 6 pruning treatments. Pruning treatments left 0, 1, 2, 3, or 4 branches below the first mainstem flower cluster; the sixth treatment was not pruned. Plants were pruned on June 22 when the first cluster on most plants was open.
Plot size:	1 row by 12 ft. Rows on beds centered 5 ft apart, plants 1.5 ft apart in row. Six test plants and two guard plants (roma type) per plot. 5808 plants per acre.
Soil type:	Tracy sandy loam.
Fertilization:	120 lb./A N from urea and 170 lb./A K ₂ O from 0-0-60 applied and incorporated before planting. Transplant starter solution supplied 1.2 lb./A N, 5.9 lb./A P ₂ O ₅ , and 2.0 lb./A K ₂ O from 9-45-15 (1.5 lb. in 50 gal. water).
Planting:	Seedlings with 4 true leaves transplanted by hand June 4. Trained in a trellis-weave system.
Weed control:	4-ft wide black plastic mulch on bed, Sencor 4F between plastic at 0.5 pt./A June 11, and hand-weeding.
Disease control:	Quadris, 5 oz./A July 6, Aug. 14; Bravo Weather Stik, 2 pt./A, July 18, Aug. 3; Kocide, 2 pt./A, July 18, 27, Aug. 3, 20.
Insect control:	Dipel, 1 lb./A, Aug. 3, 20.
Irrigation:	Drip irrigation beneath plastic mulch as needed.
Harvest:	Fruit harvested weekly from Aug. 10 through Sept. 12. Graded into marketable U.S. No. 1, U.S. No. 2 and culls. U.S. No. 1 sorted into size classes based on maximum transverse diameter: maximum large (>3.47 in.), extra large (>2.875 in.), large (>2.5 in.), medium (>2.25 in.) and small (>2.125 in.).
Data collected:	Weight and number of fruit in each category. Data analyzed by ANOVA followed by single df contrasts to evaluate effect of pruning treatments and their interactions with cultivar. When cultivar X contrast was significant at $P \leq .15$, effects of pruning treatments were evaluated separately for each cultivar.

Results and Discussion

Cultivar Effects. Results are reported in Table 1 and Fig. 1. Florida 91 produced 9% greater yield (lb. per plant) of No.1 fruit in the larger size classes and greater yield of No. 2 fruit, but total yield did not differ between the cultivars. Early yield of No. 1 fruit was 65% greater for Mountain Spring. Florida 91 had larger fruit: the average fruit size for tomatoes in the larger size classes was 15% greater than for Mountain Spring. Mountain Spring had a higher percentage of cull fruit.

Unpruned plants vs. Plants with four branches. For Mountain Spring, but not Florida 91, unpruned plants produced a greater number of No. 1 fruit in the larger size classes, and greater weight in the smaller size classes, than plants with four branches. For both cultivars, unpruned plants produced a greater total fruit count, and smaller average fruit weight, than plants with four branches. For Florida 91 only, unpruned plants produced less early yield than plants with four branches.

Plants with 0, 1, 2, 3, and 4 branches. For both cultivars, number and yield of No. 1 fruit in the larger size classes increased as the number of branches increased, but the increase from 0 to 1 branches was greater than the increase from 3 to 4 branches. Total fruit number and yield also increased as the number of branches increased. The effect on number of fruit was greater for Mountain Spring than for Florida 91. For total pounds per plant, the increase from 0 to 1 branch was greater than the increase from 3 to 4 branches. As shown in Fig. 1, if only maximum large fruit are considered, plants with 2 or 3 branches produced the greatest yield for both cultivars. Early yield did not consistently increase or decrease as the number of branches left on plant increased. For Florida 91, plants with 0 or 4 branches tended to produce greater early yield than plants with intermediate levels of pruning. For Mountain Spring, plants with 0 or 4 branches tended to produce less early yield than plants with intermediate levels of pruning. For Mountain Spring, average fruit size decreased as the number of branches increased. Each branch remaining on the plant reduced average fruit size by 0.4 oz. For Florida 91, there was no consistent relationship between fruit size and number of branches. The percentage of cull fruit decreased as the number of branches remaining on the plant increased. The biggest decrease was from 0 to 1 branch. For Florida 91, the percentage culls reached a minimum with 3 branches, and stayed low with 4 branches. For Mountain Spring, the percentage culls reached a minimum with 2 branches and then increased with more branches.

Summary. For both cultivars, the greatest marketable yield came from unpruned plants. If only the maximum large No. 1 fruit is considered, plants with 2 or 3 branches produced the greatest yield for both cultivars. Pruning affected fruit number and size to a greater extent for Mountain Spring than for Florida 91.

Fig. 1. Yield and size distribution of U.S. No. 1 fruit, and yield of U.S. No. 2 and cull fruit for 'Florida 91' (F) and 'Mountain Spring' (M) tomatoes pruned to leave 0, 1, 2, 3, or 4 branches, or not pruned (np), Wanatah, Indiana, 2001.

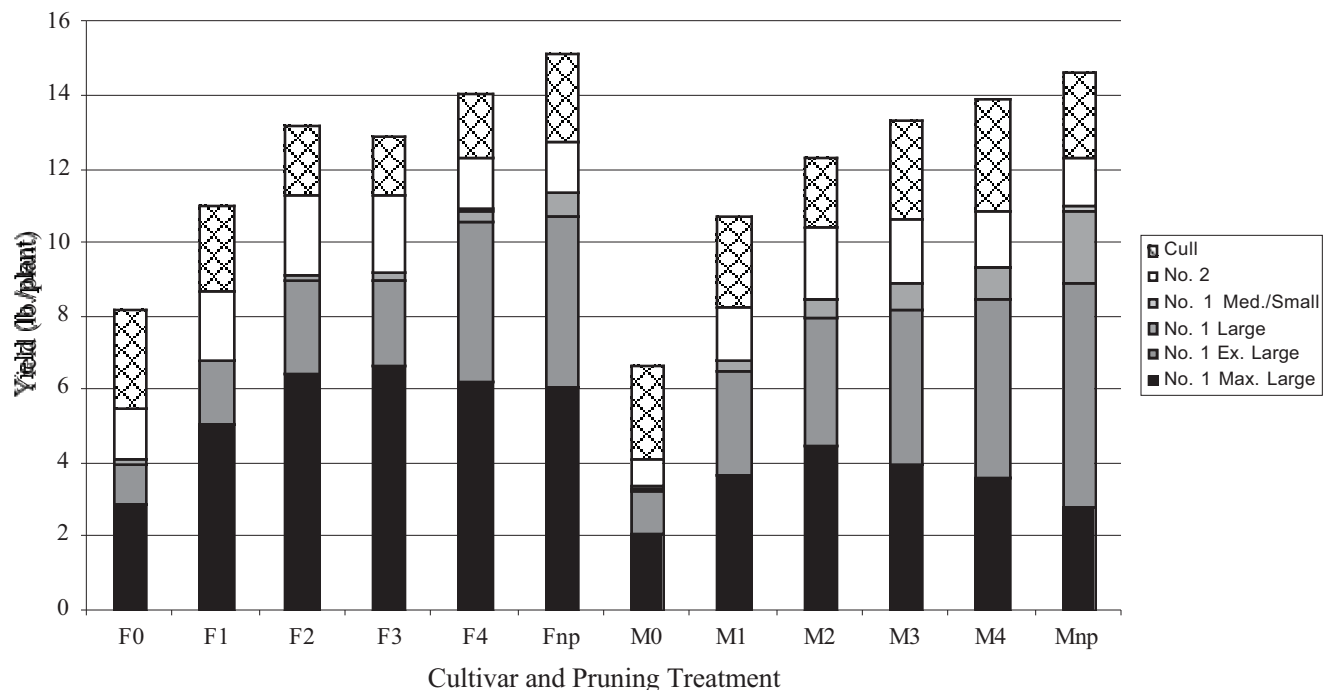


Table 1. Yield and fruit size of 'Florida 91' and 'Mountain Spring' tomatoes under five levels of pruning and without pruning, Wanatah, Indiana, 2001.#

Branches left after pruning†	U.S. No. 1 Fruit												U.S. No. 2 Fruit						All Fruit						Cull Fruit											
	Max. Lg., Extra Lg., and Large						Med. and Small						Early (8/10 to 8/24) All Sizes						number per plant						lb. per plant						% by wt.					
	F91	MS	Ave.	F91	MS	Ave.	F91	MS	Ave.	F91	MS	Ave.	F91	MS	Ave.	F91	MS	Ave.	F91	MS	Ave.	F91	MS	Ave.	F91	MS	Ave.	F91	MS	Ave.						
0	6.0	5.1	5.5	4.1	3.4	3.7	0.686	0.666	0.676	0.008	0.008	0.008	1.21	1.14	1.18	1.39	0.73	1.06	13.8	11.1	12.4	8.2	6.7	7.4	33	40	36									
1	9.3	10.9	10.1	6.8	6.8	6.8	0.733	0.623	0.678	0.008	0.053	0.031	1.10	1.60	1.35	1.93	1.43	1.68	16.6	18.3	17.5	11.0	10.8	10.9	20	23	22									
2	13.0	13.8	13.4	9.1	8.5	8.8	0.705	0.623	0.664	0.009	0.036	0.023	0.40	1.39	0.90	2.17	1.91	2.04	20.8	21.2	21.0	13.2	12.3	12.8	15	15	15									
3	13.0	15.3	14.1	9.2	8.9	9.0	0.717	0.583	0.650	0.000	0.037	0.018	0.82	1.87	1.35	2.10	1.76	1.93	19.7	24.0	21.9	12.9	13.4	13.1	12	20	16									
4	17.2	16.9	17.1	10.9	9.3	10.1	0.633	0.555	0.594	0.037	0.068	0.052	1.22	0.93	1.08	1.45	1.46	1.45	23.5	27.2	25.3	14.1	13.9	14.0	12	22	17									
Not pruned (NP)	18.8	22.3	20.6	11.4	10.9	11.1	0.604	0.486	0.545	0.007	0.153	0.080	0.33	1.46	0.90	1.34	1.34	1.34	26.5	31.9	29.2	15.1	14.6	14.9	16	15	16									
Ave.††	12.9	14.1	*	8.6	7.9	*	0.680	0.589	****	0.012	0.059	**	0.85	1.40	****	1.73	1.44	*	20.1	22.3	**	12.4	11.9	ns	18	23	**									
Significance of Contrasts†††																																				
1) NP vs 4	ns	***	**			ns		*		ns	*	ns	**	ns	ns	ns	*		ns		*		ns	ns	ns	ns	ns	ns								
2) Linear		****		****	****	****	ns	****	****		ns	ns	ns	ns	ns	ns	*	*	****	****	****	****	****	****	****	****	****	****	****	****	****					
3) Quadratic		*		***	***	***	**	ns	*	ns	ns	ns	**	**	ns	****	****	****	ns		ns	****	****	****	****	****	****	****	****	****	****					

#Fruit size classes based on transverse diameter. Max. Lg. > 3.47 in.; Ex. Lg. > 2.875 in.; Lg. > 2.5 in.; Med. > 2.25 in.; Small > 2.125 in.

†All, some, or none of the branches below the first mainstem flower cluster were removed, leaving behind the number indicated.

††Significant differences between cultivar means are indicated by *, **, ***, ****, for ps-.05, .01 and .0001, respectively.

†††ns, *, **, ***, ****; non significance and ps-.05, .01, .001 and .0001, respectively, for single df contrasts to test 1) the effect of not pruning vs. leaving 4 branches, and 2) and 3) the linear and quadratic effects of pruning.

When the interaction between cultivar and contrast was significant at p<.15, contrasts were evaluated separately for each cultivar.